Weekly Colloquium
Tuesday, 05/31/2016, 12:30pm, Billings Building – Rosedale Conference Room

“The role of local protein synthesis in axon regeneration”

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Dr. Selzer is Professor of Neurology and Director of the Shriners Hospitals Pediatric Research Center at Temple University School of Medicine. He is a leader in the movement to develop a scientific basis for neurorehabilitation, and the immediate past president of the World Federation for NeuroRehabilitation. He also served as Director of Rehabilitation Research and Development, Department of Veterans Affairs. After getting an MD and PhD from NYU in 1968, he trained in neurology at the University of Pennsylvania, where he is now Professor Emeritus. Dr. Selzer’s own research focuses on the cellular and molecular mechanisms of axon regeneration after spinal cord injury, using the sea lamprey as an experimental model. He showed that regenerating axons formed functioning synapses selectively with correct neurons across the lesion. More recently, he has emphasized that the mechanisms of regeneration differ from those of early axon development and collateral sprouting, which rely on actin-based filopodial extension to guide growth cone motility. On the other hand, regeneration of lamprey reticulospinal axons does not involve growth cones. Thus in vitro studies that investigate the effects of molecular manipulations on the behavior of growth cones may not accurately reflect mechanisms of regeneration in the CNS in vivo. Dr. Selzer’s lab is determining how chondroitin sulfate proteoglycans signal both inhibition of axon regeneration and retrograde neuronal death in neurons whose axons regenerate poorly. A second line of research is aimed at determining the role of local protein synthesis in the mechanism of axon regeneration. The tips of regenerating axons are penetrated by micropipets and axoplasm is microaspirated, in order to determine its mRNA contents. Axon tips that are actively regenerating have more mRNA than those that are static or retracting. Electron microscopic observations on these axon tips have revealed the presence of ribosomes. These preliminary findings suggest that axon regeneration in the CNS involves local protein synthesis. The relative paucity of protein synthetic machinery in the axons of mammalian CNS may be an important reason why those axons fail to regenerate.

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